

STOCKPILE REPORT

to the Congress



JANUARY - JUNE 1957

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF DEFENSE MOBILIZATION
WASHINGTON 25, D. C.

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December, 1957

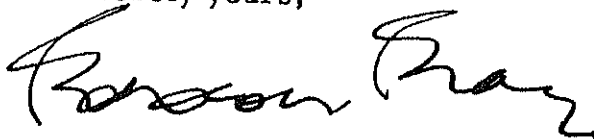
The Honorable
The President of the Senate

The Honorable
The Speaker of the House of Representatives

Sirs:

There is presented herewith the semi-annual
Report to the Congress on the Stockpiling Program in
accordance with Section 4 of the Strategic and Critical
Materials Stock Piling Act, Public Law 520, 79th
Congress. This report covers the period from
January 1 to June 30, 1954.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "Gordon Gray", written in a cursive style.

Gordon Gray
Director

PREFACE

THIS REPORT summarizes the stockpile program activities during the six months' period from January 1 through June 30, 1957.

The stockpile program has been under way since 1946, under the Strategic and Critical Materials Stock Piling Act. Although procurement proceeded slowly in the early years of the program, substantial quantities of materials have been received subsequently and the stockpile inventory position is now generally favorable as compared to stockpiling needs. In addition it is expected that stockpile objectives, which must take account of the rapid progress in technological developments and the increased power of modern weapons, will be substantially reduced for a number of materials when next reviewed against materials requirements as calculated under new strategic concepts.

A new stockpile procurement policy has been adopted since the closing date of this report. New procurement for the strategic stockpile will be authorized only to the extent necessary to attain a procurement priority level calculated to provide adequate materials for a three-year emergency period rather than the five-year period previously used as a standard. New procurement will exceed the three-year level only in a very few instances involving maintenance of the domestic production component of the mobilization base.

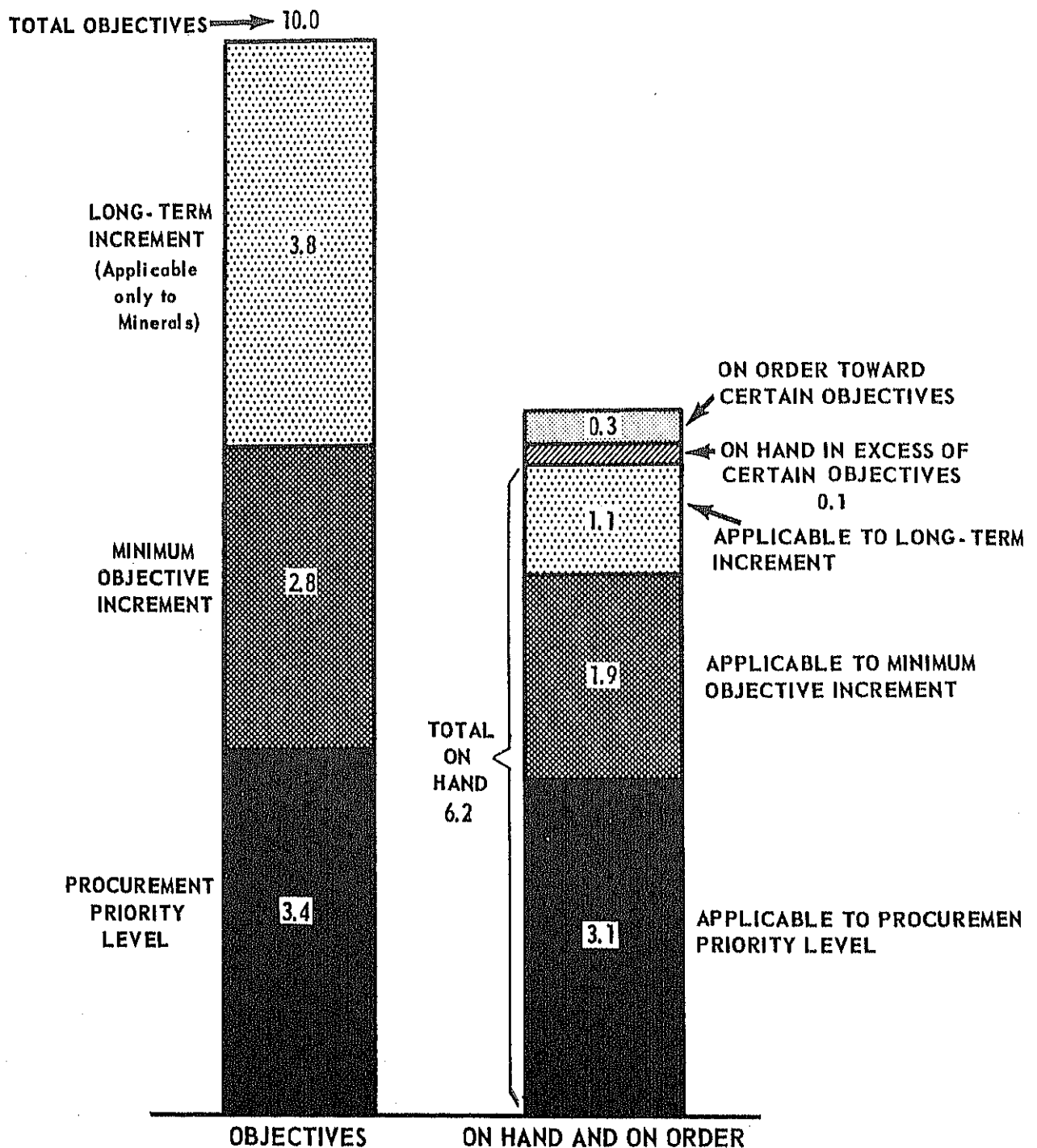
The Office of Defense Mobilization is making every effort to assure that basic stockpile policies adequately reflect changing concepts of mobilization needs. A Special Stockpile Advisory Committee, comprised of non-Government individuals has begun an extensive critical study of stockpiling requirements, policies and programs. The Committee expects to make its report and recommendations to the ODM Director in January.

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CHART 1
STATUS OF THE STOCKPILE OF GROUP 1 MATERIALS
AS OF JUNE 30, 1957

(In Billions of Dollars, Based on June 30, 1957 Market Prices)



NOTES: Only those materials for which there are official stockpile objectives are represented in this chart. Procurement is generally limited to achieving the procurement priority level.

On hand and on order figures represent only acquisitions of specified-grade materials under the Stock Piling Act; they do not include DPA, CCC or Supplemental Stockpile inventories.

Excess inventories represent quantities beyond long-term objectives for metals and minerals and beyond minimum objectives for other materials.

Status of the Stockpiling Program on June 30, 1957

IN ACCORDANCE with the provisions of the Strategic and Critical Materials Stock Piling Act, inventories of materials have been acquired in order to "... decrease and prevent wherever possible a dangerous and costly dependence of the United States upon foreign nations for supplies of materials in time of national emergency."

During the period of this report, stockpile inventories of materials for which there are stockpile objectives (Group I) increased to a total of about 25,606,000 tons. This tonnage is valued at \$6.2 billion at June 30, 1957 market prices, a decrease from that shown for December 31, 1956 due principally to declines in market prices during the six months' period. Materials on order for the stockpile at the end of June amounted to approximately \$250 million.

Of the total tonnage, around 25,481,000 tons are applicable to present stockpile objectives and approximately 124,000 tons are excess inventories acquired against previously higher objectives. This excess is valued at approximately \$120 million, \$90 million (21,000 tons) of which is over long-term objectives for certain metals and minerals

and \$30 million (103,000 tons) over minimum objectives for certain of the other materials for which there are no long-term objectives. In addition, there are still in inventory 147,000 tons of materials that are in Group II pending further review of stockpiling needs, and other materials that have been removed from the stockpile list but not yet disposed of. There are also 110,000 tons of non-specification-grade materials acquired mostly through surplus declarations.

Stockpile objectives in effect at the end of the period were valued at a total of approximately \$10 billion. Within this amount, minimum objectives are valued at \$6.2 billion, including \$3.2 billion creditable to procurement priority levels of which \$2.6 billion is for metals and minerals and \$600 million for other materials. Total long-term increments beyond minimum objectives, applicable only to metals and minerals, are valued at \$3.8 billion.

Stockpile deliveries and commitments during the period, summarized in the following table, totaled \$205.6 million and \$133 million respectively.

Deliveries and Commitments for the Strategic Stockpile, January-June 1957

Valued at June 30, 1957 market prices

[Millions of Dollars]

Source of stockpile materials	Toward minimum objectives		Additional toward long-term increments		Total	
	Deliveries	Commitments	Deliveries	Commitments	Deliveries	Commitments
Open market.....	52.40	8.80	41.80	10.30	94.20	19.10
DPA inventories.....	35.10	37.30	10.50	12.70	45.60	50.00
CCC inventories.....	55.80	53.90	0	0	55.80	53.90
Foreign aid programs ¹	1.90	1.90	8.00	8.00	9.90	9.90
Surplus declarations ¹	0.04	0.04	0.10	0.10	0.14	0.14
Total.....	145.24	101.94	60.40	31.10	205.64	133.04

Source of data: General Services Administration.

¹ These materials are supplied without cost to the stockpile.

ACHIEVEMENT OF STOCKPILE OBJECTIVES

Of the 76 strategic and critical materials for which there are official stockpile objectives (Group I materials), inventories for 63 materials by June 30, 1957 had reached or exceeded the respective procurement priority levels. For 47 of the 63,

the minimum objective had been fulfilled, and among them the long-term increment for 18 metals and minerals was on hand, these objectives representing preparedness against a deficit for a five-year emergency.

The Current List of Strategic and Critical Materials for Stockpiling is included as Appendix B

to this report. Listed below are the Group I materials for which inventories acquired under the Stock Piling Act substantially equal or exceed the various levels within the objectives. These lists are subject to change as inventories increase and as stockpile programs are revised; for example, extra long staple cotton no longer is shown as the objective has been eliminated.

Materials for Which Inventories Substantially Equal or Exceed Present Procurement Priority Levels

Abrasives, Crude Aluminum Oxide	Lead
Agar	Manganese, Battery Grade, Natural Ore
Aluminum	Manganese, Battery Grade, Synthetic Dioxide
Antimony	Manganese, Chemical Grade, Type A
Asbestos, Chrysotile	Manganese, Metallurgical Grade
Asbestos, Crocidolite	Mercury
Bauxite, Metal Grade, Surinam Type	Mica, Muscovite Splittings
Bauxite, Refractory Grade	Mica, Phlogopite Splittings
Beryl	Molybdenum
Bismuth	Nickel
Cadmium	Opium
Castor Oil	Palm Oil
Celestite	Platinum Group Metals, Iridium
Chromite, Chemical Grade	Platinum Group Metals, Platinum
Chromite, Metallurgical Grade	Pyrethrum
Chromite, Refractory Grade	Quartz Crystals
Cobalt	Quinidine
Coconut Oil	Rare Earths
Columbite	Rubber, Natural
Copper	Shellac
Cordage Fibers, Abaca	Silk, Raw
Cordage Fibers, Sisal	Silk Waste and Nolls
Diamonds, Industrial--Bort	Sperm Oil
Diamonds, Industrial--Stones	Talc, Steatite, Block
Feathers and Down, Waterfowl	Tantalite
Fluorspar, Acid Grade	Tin
Graphite, Ceylon--Crystalline and Amorphous	Tungsten
Graphite, Madagascar--Crystalline Flake and	Vanadium
Than gas-	Vegetable Tannin, Chestnut
	Vegetable Tannin, Quebracho
	Vegetable Tannin, Wattle
	Zinc
Iodine	

Materials for Which Inventories Substantially Equal or Exceed Present Minimum Objectives

Abrasives, Crude Aluminum Oxide	Lead
Agar	Manganese, Battery Grade, Natural Ore
Aluminum	Manganese, Metallurgical Grade
Asbestos, Chrysotile	Mercury
Asbestos, Crocidolite	Mica, Muscovite Splittings
Bauxite, Metal Grade, Surinam Type	Palm Oil
Bauxite, Refractory Grade	Platinum Group Metals, Iridium
Beryl	Platinum Group Metals, Platinum
Bismuth	Pyrethrum
Cadmium	Quartz Crystals
Castor Oil	Quinidine
Celestite	Rare Earths
Chromite, Metallurgical Grade	Rubber, Natural
Coconut Oil	Silk, Raw
Columbite	Silk Waste and Nolls
Cordage Fibers, Abaca	Sperm Oil
Cordage Fibers, Sisal	Tantalite
Diamonds, Industrial--Stones	Tin
Feathers	Tungsten
Fluorspar, Acid Grade	Vanadium
Graphite, Ceylon--Crystalline and Amorphous	Vegetable Tannin, Chestnut
Graphite, Madagascar--Crystalline Flake and Fines	Vegetable Tannin, Quebracho
Graphite, Other Than Ceylon and Madagascar--Crystalline	Vegetable Tannin, Wattle
Hyoscine	Zinc

Materials for Which Inventories Substantially Equal or Exceed Present Long-Term Objectives

(Applicable Only to Metals and Minerals)

Abrasives, Crude Aluminum Oxide	Manganese, Battery Grade, Natural Ore
Asbestos, Chrysotile	Mercury
Asbestos, Crocidolite	Platinum Group Metals, Iridium
Bauxite, Refractory Grade	Platinum Group Metals, Platinum
Celestite	Quartz Crystals
Columbite	Rare Earths
Graphite, Madagascar--Crystalline Flake and Fines	Tantalite
Graphite, Other than Ceylon and Madagascar--Crystalline	Tin
	Tungsten
	Vanadium

Stockpile Objective Reviews

Stockpile objective reviews have been limited during this reported period, principally because of the likely downward revision in a number of materials requirements as a result of changes in strategic planning concepts.

Rapid technological advances in weapons have necessitated a clarification of the roles and missions of the military departments, and the first new computations of mobilization requirements from these departments are not expected to be available to ODM until late 1957 or early 1958.

The military departments have been developing new emergency requirements from which new estimates for stockpiling needs may be calculated. It is expected these requirements will reflect materials consumption under varying conditions of warfare with weapons systems now available or to be available in the near future. Stockpile reviews have proceeded for materials not significantly affected by military requirements.

Storage, Security and Maintenance

Stockpile Storage Security.--The over-all security position of materials in stockpile inventory is considered to be generally favorable, according to tests conducted under simulated nuclear weapon attack conditions. The dispersal of stockpiles to many consuming areas and the limitation of quantities at any single facility minimize the probability of outright destruction and provide alternate points from which materials may be delivered to consumers in wartime free of fallout effects.

The problem of accessibility to materials, however, is increasing in magnitude as a result of larger weapons and the potentiality of radio-active contamination of large geographical areas.

One of the biggest problems in stockpile security is the substantial accumulation of destructible-type materials, i.e., materials that would be subject to loss by fire from exposure to the direct thermal effects of nuclear weapons or from incidental ig-

nitions near a target, including firestorms, and to loss from blast scattering.

Since March 1, 1955, when storage policies were revised to provide criteria for security of the stockpile against direct losses from massive nuclear attack on the United States, 215,000 tons of destructible materials have been relocated from storage facilities in or near critical target areas to safer locations. Such relocations generally were accomplished incident to rotation activity and consequently involved little direct relocation expense.

Depot Security Against Nuclear Thermal Effects.--The Interdepartmental Stockpile Storage Committee has recommended reemphasis on depot cleanliness and higher standards of structural maintenance because ignitions from the thermal effect of large nuclear weapons of inflammable materials such as grass, paper, and rotten wood even at great distances could spread to destructible stockpile materials. In addition to fire security standards now in effect, precautions will include reflective color painting of wooden structural parts or covering of wooden parts with metal in the course of facility care.

The problem of protective shelter for depot personnel is also under study.

Outdoor Storage.--To compensate for the shortage of indoor warehouse space in desirable areas, outdoor storage of a number of metals and minerals is being authorized and a specification for a galvanized drum has been developed especially for stockpiling outside.

A few stockpile minerals, such as acid-grade fluor spar and various grades of manganese, are of very fine size and require protection against blow-away and erosion losses. The value of these materials is too low in relation to their bulk to warrant drumming or shed storage so it has been necessary to store them outdoors in bulk piles covered with a cement grout. Also, it was found recently that ferrochromium, a higher cost material, could also be stored outdoors provided the grout covering itself did not contaminate the material. Consequently, grouting procedures were completely revised and specifications were developed for a rigid metal-reinforced cement cocoon which is expected to provide adequate protection for many years and effect considerable savings in long-term maintenance costs.

Inspections for Maintenance and Quality Control.--During January-June 1957 periodic inspections of stockpile materials in storage totaled 1,926, and reports were made as to the condition of the materials with appropriate recommendations for qualitative maintenance of the materials inspected at each location. In addition, more than 34,000 inspections were made of new materials, valued at approximately \$380,000,000, delivered under strategic stockpile, Defense Production Act, Commodity Credit Corporation contracts, and P.L. 733 (84th Congress) programs. About 80 inspectors through-

out the United States are assigned to this activity. In fiscal year 1957 about 60,500 inspections were made of material valued at \$778,000,000.

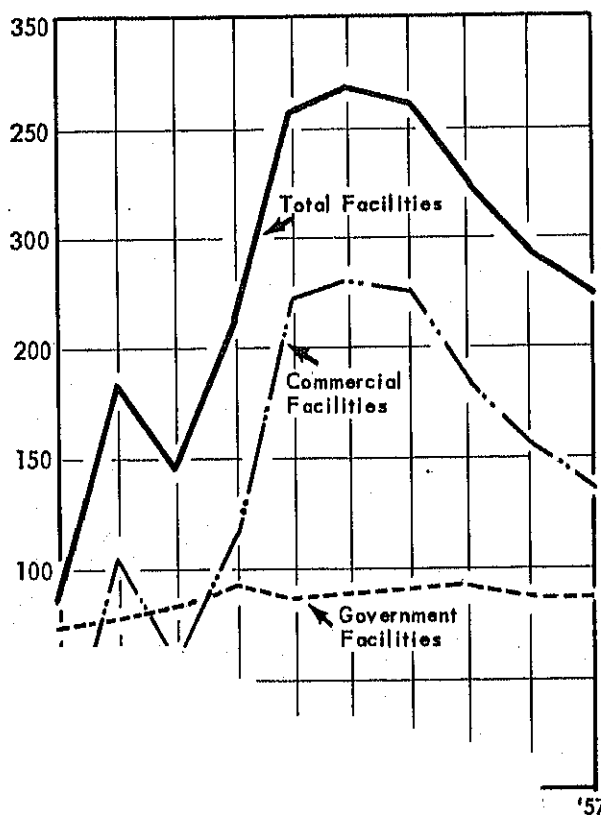
Storage Facilities in Use.--Strategic and critical materials were stored at 223 locations as of June 30, 1957, as follows:

	June 30, 1957	Change in last 6 months
Military depots	65	...
GSA warehouses	15	...
Other Government- owned sites	7	...
Industrial plant sites...	36	-1
Leased commercial sites	10	...
Commercial ware- houses	87	+1
Commercial tank facilities	1	-4
Port storage sites	2	-1
Totals	223	-5

The chart below shows the number of facilities used for stockpiling in the past decade.

The number of facilities in use has little if any relationship to tonnage in any one facility or to total tonnage on hand. Some locations store only a

NUMBER OF STOCKPILE STORAGE
FACILITIES IN USE
1948 - 1957



few hundred tons while others store hundreds of thousands of tons. The significant points of evaluation of the chart are that (1) the number of Government facilities available for stockpile use has been fairly constant since the Korean emergency and (2) commercial storage facilities have absorbed the impact of added warehouse and handling requirements during and since the Korean emergency. The use of commercial facilities continues at a high level, although the number has been substantially reduced since June 1953.

The high point in the use of commercial storage facilities shown for 1949 reflects the transfer to the stockpile of surplus rubber already stored in public warehouses by the Rubber Reserve Corporation. As this rubber was rotated the fresh stocks were stored in surplus Government depots. With the increase in the rate of stockpiling during the Korean emergency, space requirements increased rapidly and the number of commercial facilities in use again rose from a low of 59 in July 1950 to a high of 230 by mid-1953. The number has slowly declined since 1953 as additional Government space has been made available by the Department of Defense and by the completion of a few warehouses for which construction was authorized during the Korean period.

Tonnage Handled.--During January-June 1957 about 1,450,000 tons of strategic and critical materials were received and stored. Of this tonnage, 31% was added to strategic stockpile inventories, 33% to Defense Production Act inventories, and 36% to Commodity Credit Corporation inventories.

Tonnage handled in the past 2 years has been as follows:

July-December 1955	850,000
January-June 1956	1,050,000
July-December 1956	1,150,000
January-June 1957	1,450,000

Repacking.--GSA has surveyed the physical condition of containers and structures at 32 locations as a basis for a long-range repackaging and rehabilitation program. During the period over 30,000 tons of materials in substandard or deteriorated containers were repackaged into containers suitable for long-term storage. Additional materials are presently stored in containers which need to be replaced or reconditioned. To the extent possible, this repacking will be accomplished concurrently with inventory-taking.

Progress on Inventory-Taking.--Inventory-taking at the 15 GSA-operated storage sites has been completed at 4, is almost complete at 1, and continues at 10 others; it has been initiated at 18 commercial warehouses. The target date for completion of the physical inventory at both GSA and commercial warehouses is September 30, 1958.

Arrangements also were being made with the Department of Defense for taking inventories of the materials stockpiled at military depots.

Storage Instructions

The Interdepartmental Stockpile Storage Committee has recommended, and ODM has approved the revision of storage instructions for about 35 materials in the first 9 months of 1957. One aspect of the revisions is the emphasis on orderly stacking of materials so that the taking of periodic inventories is facilitated.

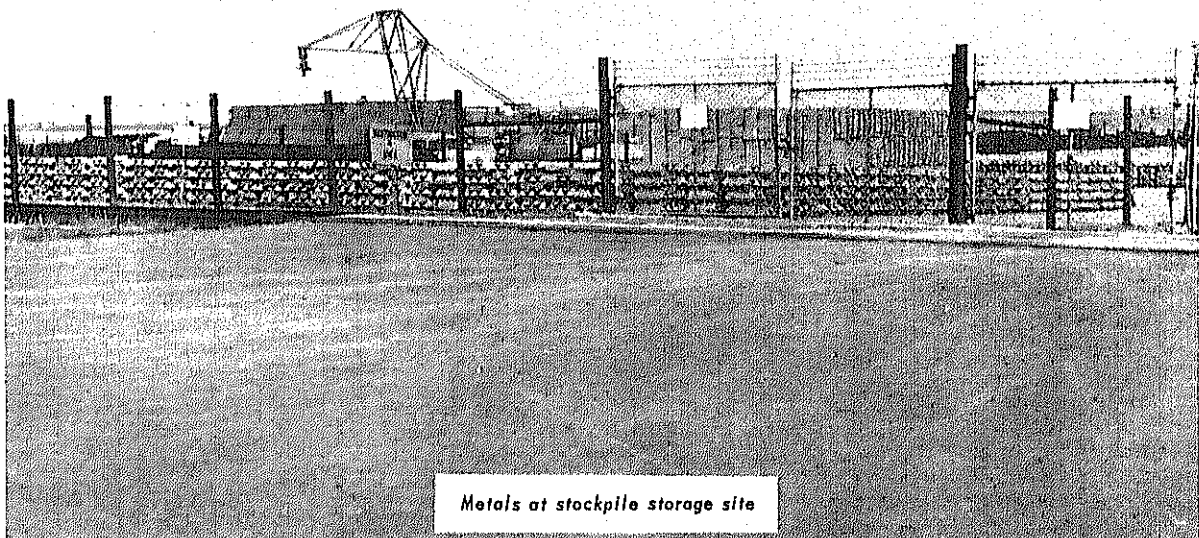
Stockpile Materials and Natural Radioactivity

The problem of security in this nuclear age continues to be studied. In 1955 policies were adopted providing criteria for security of stockpile materials against destruction by the thermal and blast effects of nuclear weapons, and against denial which might result from some materials becoming radioactive as a result of a close nuclear weapon burst. The data developed on radioactivity as a result of a possible close burst raised questions on the natural radioactivity level of materials and this led to a program in 1956 of testing the natural ores in the stockpile. The test reports by the Atomic Energy Commission up to this time show that a few stockpile ores are slightly radioactive. To prevent any unnecessary exposure of workers even to very low levels of radioactivity the standards for han-

dling these ores are being upgraded over previously normal commercial practice.

Alternate Records and Alternate Operating Centers.—An essential element of the stockpile security position is the provision for continuity of the management function from the materials policy agency to the emergency allocations agency and to the custodian. The effectiveness of planning in this respect is tested annually in operations from the respective relocation sites of ODM, Commerce, Interior and GSA. Duplicate stockpile inventory records are maintained at a number of relocation sites, in addition to a damage analysis inventory which is stored on magnetic tape for prompt processing by the scientific computer at the National Damage Assessment center.

The use-technology of many stockpile metals and minerals requires that records be maintained on the analysis of the various stockpiles. The Department of Commerce and the General Services Administration, which would be vitally concerned with allocations, deliveries and consumer relationships in time of emergency, have determined which materials require close control, and arrangements are being made for alternate storage of lot analysis records for those commodities.



Metals at stockpile storage site

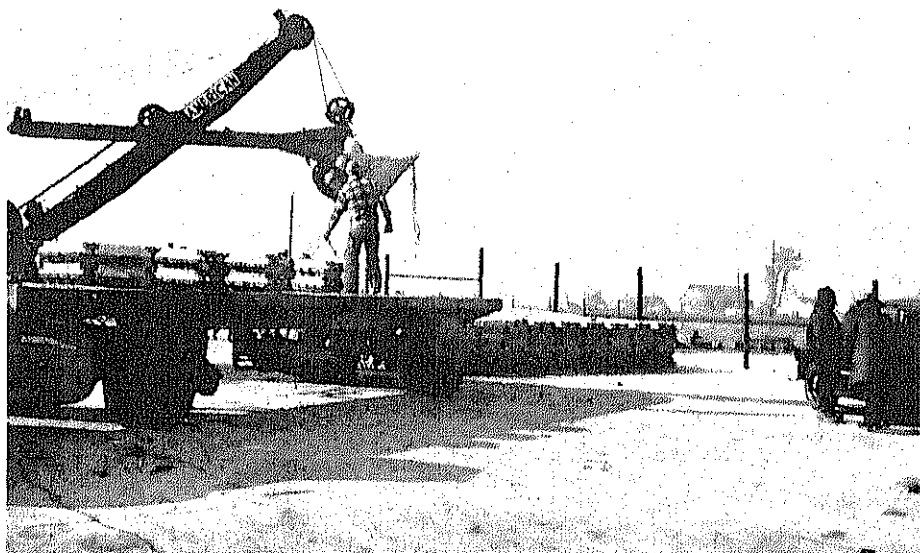
Barter Procurement of Strategic and Critical Materials

UNDER AUTHORITY for barter contained in the Commodity Credit Corporation Charter Act, as amended, the Agricultural Trade Development and Assistance Act of 1954, and related legislation, the CCC entered into 40 barter contracts for strategic and critical materials valued at \$75 million during January-June 1957. The value of these barter contracts fell considerably below the \$133 million of the previous six months and the \$246 million for January-June 1956.

Total deliveries of strategic materials under barter contracts, from July 1954 through June 1957, are valued at \$463 million, of which \$137 million worth was delivered during January-June 1957. From July 1954 through June 30, 1957 materials valued at approximately \$124 million were transferred to the strategic stockpile against minimum objectives. A total of \$213 million worth of strategic and critical materials had been placed in the supplemental stockpile by June 30, 1957. The remainder has not yet been moved out of CCC inventory.

The barter program was suspended at the end of April to permit a detailed study by the Department of Agriculture of safeguards against the substitution of barter transactions for dollar sales without a net gain in total exports of agricultural surpluses.

Under the Department's revised barter program, announced May 28, 1957, United States firms may participate in barter only if they can satisfy the Commodity Credit Corporation that a proposed barter transaction will mean a net increase in United States exports of the agricultural commodity involved. Proof is to include assurances satisfactory to CCC that agricultural commodities exported under barter contracts will not be transshipped from the approved country of destination. The agricultural commodities must be designated in the barter contracts and must be exported to one or more designated friendly countries. The origin of the strategic materials to be acquired by barter must be designated and must be limited to friendly countries, and the materials must not have been produced or processed in the United States.



Unloading and stacking lead for the supplemental stockpile

Developments in Strategic and Critical Materials

AGAR.—As a result of changes in requirements for agar in bacteriological media, the quality of the agar in the stockpile is under review. Samples are being evaluated in laboratory tests on the basis of proposed new specifications for bacteriological-grade material.

ALUMINUM.—The continuing high-level production of aluminum metal, together with the waiver of Government call rights during the last two years, has enabled the industry to satisfy commercial demand. From January to June, 237,500 tons of primary aluminum were put to the Government, 11,500 tons of which were accepted during the period. Put rights were exercised by producers under Defense Production Act contracts which guarantee a market for a portion of their surplus new production for specified periods. In view of the favorable stockpile position it was decided, with the advice of industry, that no Government calls for aluminum would be made during either half of 1957; acquisitions will be made only when producers exercise put rights under the existing DPA contracts. In this way favorable conditions are provided for the continued growth of the industrial uses of aluminum and for increased production.

ANTIMONY.—Although antimony is readily available from foreign sources, procurement policies have favored domestic producers. Contracts were negotiated with two domestic producers for delivery of Grade B antimony to the stockpile over an 18 months' period.

ASBESTOS.—Potential shortages of amosite asbestos in an emergency remain a major concern. Possibilities of further use of substitutes and other conservation measures are being studied. Additional quantities are purchased for the stockpile when available.

BAUXITE.—A substantial quantity of Jamaica-type metallurgical-grade bauxite was acquired for the stockpile during the first half of 1957 from deliveries under a Defense Production Act contract. Current availability of Surinam-type ore to U. S. producers is just about in balance with production requirements. A study of improved methods of mining bauxite has been undertaken by the Bureau of Mines to increase the availability of bauxite from domestic deposits.

BRISTLES, HOG.—The third offering under the program for disposal of stockpiled Chinese hog

bristles was made during this period. As of June 30, a total of 649,000 pounds of the bristles had been sold, with a recovery to the Government of \$4,756,000 from the proceeds of the sale.

CASTOR OIL.—More than 2,100,000 pounds of castor oil was rotated during this reporting period, the oil being removed from commercial storage facilities on the west coast and replaced with oil at Government tank farms on the east coast. It is expected that 2,000,000 pounds still in west coast commercial storage facilities will be sold under the rotation program.

Viability tests showed that rotation of castor bean stocks being held by the Department of Agriculture was not necessary this year. As recommended by ODM, these stocks are being maintained in order to provide for the necessary requirements for seed for domestic production of castor oil in an emergency. The Commodity Credit Corporation has stored the yield from 50 acres of foundation castor bean seed planted by the Texas A & M Experiment Station from the 500 pounds of breeder castor bean seed. CCC is also maintaining a limited quantity of castor bean hulling and harvesting equipment for use in event of an emergency.

New varieties of castor bean seed, such as the first dwarf-internode variety, yielded 2,000 to 2,700 pounds per acre under good growing conditions. The U. S. 415 variety, developed in California, has produced 3,500 to 4,000 pounds per acre. U. S. 51 hybrid, developed in Oklahoma, resembles U.S. 415 in yield potential and is a promising variety for irrigated production in Arizona and New Mexico.

CHROMITE.—Substantial quantities of ferrochrome and ferrochrome silicon, toward the metallurgical chromite objective, were purchased for the stockpile from CCC inventories.

COBALT.—A Defense Production Act contract was entered into to expand nickel production in Cuba, with the provision that the company may also tender cobalt to the U. S. Government. A stockpile contract with another foreign producer was terminated by mutual agreement.

COCONUT OIL.—Approximately 365,000 pounds of crude coconut oil was rotated during January to June 1957. Stockpile specifications are being revised to conform with higher quality requirements as a result of experience gained from long-term stockpile storage. The tank of refined coconut oil held for experimental purposes continues to

show excellent stability after four years of storage. Total consumption of coconut oil has not changed much in recent years. Use of coconut oil in soap is decreasing while its use in synthetic detergents and food products is increasing.

COLUMBITE.—The supply of columbite was adequate for all industrial uses with production facilities not fully utilized.

COPPER.—If the recent downward trends in the market price continue, the Government may be obligated to purchase up to 10,000 tons of copper a month under floor price purchase contracts entered into under the Defense Production Act of 1950, as amended.

CORDAGE FIBERS.—Approximately 45,600,000 pounds of cordage fibers were rotated during January to June; 16,900,000 pounds were abaca and 28,700,000 pounds were sisal. The stockpile specifications for cordage fibers were revised to eliminate some inferior grades of abaca and to include hand-cleaned Philippine abaca. Tests to determine the storage life of cordage fibers have not indicated a trend of deterioration over a four-year period except for one grade, and it is believed that the test fiber for this grade may have been inferior when acquired.

COTTON, EXTRA LONG STAPLE.—ODM has removed extra long staple cotton from the List of Strategic and Critical Materials for Stockpiling and directed that the stockpile inventory be sold. This action, which was taken after review by the Defense Mobilization Board, was based on a finding by the Department of Agriculture that in case of an emergency a sufficient quantity of domestic extra long staple cotton can be grown to meet current and anticipated military and essential civilian needs. A disposal plan is being developed by GSA, and it is planned that the Department of Agriculture will dispose of the cotton through its sales outlets.

The American-Egyptian variety, Pima S-1, continues to be well received by American spinners and appears to be of increasing interest to foreign spinners. Ample seed was available for the expanded acreage that has been planted this season.

DIAMOND DIES, SMALL.—A full-scale review of the potential wartime supply-demand position for diamond dies, made last fall, revealed that unless some action was taken, dies of .0015 inch diameter and smaller would not be available in adequate quantity in wartime to meet all essential requirements. The Office of Defense Mobilization, with the advice of interagency materials committees, established stockpile objectives and made plans to begin at least limited procurement as promptly as possible. At the same time, with a view to improving the wartime supply outlook, the Business and Defense Services Administration, Department

of Commerce, was asked to evaluate the economic feasibility of expanding current domestic production and to recommend a program for achieving a desirable level of production for maintenance of the mobilization base. The extent to which domestic production and productive capacity can be expanded and maintained at competitive market prices will have a bearing upon the magnitude of the stockpile program for diamond dies.

BDSA has consulted both producers and users of small diamond dies concerning technical specifications for dies to be stockpiled. When these specifications have been completed, the potential usefulness of dies transferred to the stockpile after World War II can be determined and plans made for further procurement. Also, stockpile inventories of wire die stones and diamond dies acquired through the transfer of surplus stocks are being surveyed by the Defense Materials Service, General Services Administration, to determine quantities by size categories.

DIAMOND TOOLS.—Business and Defense Services Administration has prepared a program for evaluation of the stockpile inventory of diamond tools which was acquired through the transfer of post-war surpluses. The Defense Materials Service will survey the inventory and report to ODM.

FEATHERS AND DOWN.—A research program was initiated to evaluate stockpiled feathers and down by intensive sampling and analyses. The possibility of beneficiating low-grade material also is being studied. GSA discussed with the Army Quartermaster Corps the possibility of using stockpiled feathers and down in the manufacture of Army sleeping bags for current use if it develops that some of the stockpile material should be rotated.

FERROALLOYS, GENERAL.—In response to ODM's request for a comprehensive study of U. S. capacity for production of ferroalloys, the Department of Commerce began surveys on chromite, manganese, molybdenum, silicon, tungsten, and vanadium as the first step in the evaluation of the U. S. potential for total ferroalloy production in wartime. To plan effectively in this area for full mobilization it is necessary to study the current productive capacity and determine the industry's capability for converting to the production of alternative ferroalloys.

FLUORSPAR.—Domestic metallurgical-grade fluorspar was contracted for under the premium-price stockpile purchase program. Specifications for strategic stockpile purchases of metallurgical-grade fluorspar were altered, at the request of domestic producers, to permit a larger maximum dimension of lumps.

IODINE.—The National Bureau of Standards conducted research on methods of storing iodine which is expected to be helpful in alleviating some of the

problems of stockpiling this material. Stoppers and liners for stoppers for stockpile iodine should be improved as a result of this research work.

JEWEL BEARINGS.—A contract has been negotiated for the purchase of jewel bearings for the stockpile from the domestic facility at Rolla, North Dakota. The Department of Defense, under whose cognizance the plant at Rolla had been operated until recently, was unable to justify continued operation for its own purposes. It is expected that the stockpile purchases will aid in sustaining the domestic production of jewel bearings for a relatively short period, and efforts are continuing toward development of other means for future operation. Most of the employees of the plant are Indians from the nearby Turtle Mountain reservation.

LEAD AND ZINC.—Monthly purchases of lead and zinc continued toward the long-term stockpile objectives. By May, industry offers of domestic lead and zinc greatly exceeded the quantities that could be purchased in accordance with ODM directives even though large quantities of imported lead and zinc were absorbed by the supplemental stockpile as a result of barter acquisitions.

MANGANESE.—A study of specifications used in past procurement of chemical grade manganese indicates that minor revisions, acceptable to industry, would permit procurement of TYPE B under this grade to be stepped up considerably. Also, the extent of the potential use of stockpiled battery grade manganese in lieu of chemical grade, Type B, has been under study. After four years of construction and mine development, substantial shipments of high-grade metallurgical manganese ore from the large development in Amapa, Brazil are being received under a Defense Production Act contract.

MERCURY.—The purchase guarantee program for mercury, authorized in July 1954 under the Defense Production Act was extended in March 1957 to December 31, 1958 to permit acquisition in 1958 of up to 50,000 flasks at a guaranteed price of \$225 a flask. Of the 50,000 flasks, a total of 30,000 may be acquired from domestic (including Alaskan) production and 20,000 from Mexico.

Under the 1954 authorization, the Government has guaranteed to purchase up to 200,000 flasks of mercury at \$225 a flask, a total of 125,000 flasks to be from domestic production and 75,000 flasks from Mexico.

This program was initially authorized in 1954 as an incentive for increasing production, and combined U. S. and Mexican output has risen by more than 50 percent over 1953 levels.

During the January-June 1957 period the market price has been higher than the price guaranteed by the Government and only nominal offerings have been made under the program.

MICA.—The stockpile position for Muscovite block and film mica is still not satisfactory, and special efforts are being made to solve the mica problems. Contracts are being negotiated for the delivery of block and film mica over a five-year period under an extension of the Defense Production Act foreign mica expansion program. The strategic-grade mica so acquired will be sold to the stockpile. Because of the lack of sufficient quantities of strategic natural mica for use in vacuum tubes and capacitors, programs are under way for the development of reconstituted synthetic mica sheets as a substitute. Arrangements have already been made to test the end product's performance, in the event research in this field proves fruitful.

The expansion goal for substitutes for strategic grades of natural block and film mica was closed in June because the incentive of rapid tax amortization had not been utilized by industry.

MOLYBDENUM.—Because of tight world market conditions, about 3,000,000 pounds of molybdenum scheduled for the DPA inventory was diverted to industry during the six months' period. The satisfactory status of the stockpile inventory permitted this diversion.

NICKEL.—Maximum diversion to industry of nickel scheduled for delivery to the Government continued during the January-June period. Diversions have also been authorized for the second half of 1957. Under a Defense Production Act contract a refinery and related facilities in the United States and other facilities in Cuba will be constructed for the production of not less than 50,000,000 pounds of nickel metal annually. The construction of the 75 percent expansion of the U. S. Government's plant at Nicaro was completed during the period and the facility is now operating at its expanded capacity. The expansion goal for nickel was closed on June 28. The annual supply of 440,000,000 pounds of nickel available to the United States by 1961 called for under the goal will be met when presently planned capacity comes into production.

OPIUM.—Recent germination tests indicated that the viability of the opium poppy seed being stocked for possible emergency planting is decreasing rapidly. The possibility of replacing the variety currently in storage with a variety of higher morphine content from the breeding program is being considered. Several improved strains are being tested for this purpose. With the improved method for extracting morphine from dry capsules developed last year, the stock of poppy seed may provide a basis for producing a substantial portion of the national morphine requirement in an emergency period.

PALM OIL.—Approximately 12,800,000 pounds of surplus stockpile palm oil was sold during the period. Practically all of the excess palm oil in the stockpile has now been disposed of.

PYRETHRUM.—During January to June, 78,800 pounds of pyrethrum extract was sold as surplus to stockpile needs.

RUBBER.—The National Bureau of Standards and the National Academy of Sciences jointly have initiated a research program to determine the causes of deterioration of crude rubber and means of controlling it. It is hoped that the results of this research may help reduce the volume of stockpile rubber rotation. The closure of the Suez Canal had little, if any, effect on the Government's rubber rotation program; approximately 20,000 long tons of rubber was received on a rotation basis during the six months' period. By the end of January it was apparent that the shipping lines and importers had made the necessary adjustments for the longer haul from the Far East and that rubber imports were continuing to arrive in ample volume to satisfy requirements without change in the Government's rotation procedures.

SELENIUM.—In view of the significant improvement in the selenium supply-demand situation since mid-1956, stockpile purchases are being held to token amounts pending a new review of the stockpile objectives. Productive capacity has increased, but at the same time demand has diminished, principally in the rectifier industry. Better quality rectifiers are being produced with smaller amounts of selenium or by using alternate materials such as high-purity silicon. As a result of adequate supply, the price of commercial grade selenium dropped from \$15.50 to \$12.00 to \$10.50 a pound during this six months' period. High-purity selenium followed the downward price trend, but remained at \$3.00 a pound higher than commercial grade. The expansion goal for selenium was closed in February because no application for rapid tax amortization had been received for several years. The Bureau of Mines search for new selenium sources, under contract with the General Services Administration, was terminated June 30. Encouraging sources were located in the Gas Hills area of Wyoming and the Ambrosia Lake area in New Mexico, where selenium is associated with pyrite occurring in uranium ores.

TANNING MATERIALS.—Changes in the wartime supply-requirements outlook for two of the stockpile vegetable tannins, wattle and chestnut, required changes in the stockpile objectives. Except for a limited captive output, the domestic production of chestnut extract has virtually ceased. Breeding experiments by the Department of Agriculture have

revealed that it is possible to increase greatly the tannin content and purity of canaigre, a potential substitute for the strategic and critical tanning materials. These experiments should be of considerable importance in planning future breeding investigations. Studies of excessive sludging during tanning indicate that the problem is associated with the starch component of the canaigre root. Resolution of this sludging problem would allow the use of solvent extraction with its higher recoveries and potential economies. A four-year study has indicated that generally tannin content of canaigre roots increases with age. This information in combination with yield results will be helpful in determining the cost of production and the probable return to the farmer when canaigre is allowed to grow more than one season before harvesting.

TANTALITE.—Demand for tantalum for use in capacitors continued to expand rapidly. Supplies of high-purity sheet were being quoted on a 48-week delivery, but new production facilities under construction are expected to alleviate the situation and keep pace with the future increase in demand.

TITANIUM.—Existing sponge productive capacity is now more than adequate for meeting foreseeable military requirements. Government stocks of titanium sponge have been held in Defense Production Act inventories so that they could be made available to industry to meet any surge in sponge requirements. Two companies are selling a substantial part of their titanium sponge production to the Government under provisions of DPA expansion program contracts.

TUNGSTEN.—The Government inventory is in excess of mobilization requirements, and efforts are under way to reduce the quantity on order. During this period quantities covered by two stockpile contracts were reduced substantially, the reductions totaling more than \$11,600,000. Authorization still existed under Public Law 733 for purchase of nearly a million short ton units of tungsten trioxide, but funds were not provided by the Congress and Government acquisition from domestic producers was not resumed. Domestic production of tungsten concentrates diminished during the first half of 1957. Although industry consumption of tungsten was somewhat higher than in the first half of 1956, most of the purchases were from foreign sources and stocks held by domestic producers continued to increase.

STOCKPILING

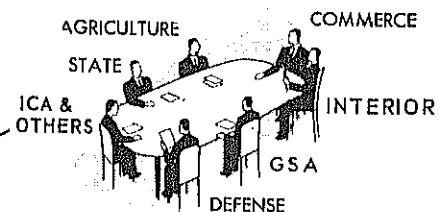
\$10,000,000,000



STRATEGIC
FACTORS



SUPPLY-DEMAND DATA
PROGRAM



OFFICE OF DEFENSE MOBILIZATION

1. Establishes Defense Materials Policies and Programs
2. Determines Stockpile Materials
3. Sets Stockpile Objectives
4. Determines Purchase Programs



OPERATIONS

GENERAL SERVICES ADMINISTRATION

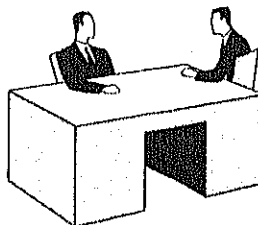
DEFENSE MATERIALS SERVICE

BUYS OR ACQUIRES AND STORES STOCKPILE MATERIALS FROM:

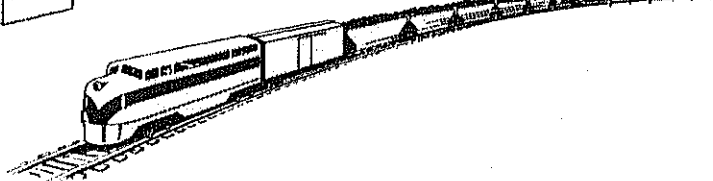
GOVERNMENT SOURCES

SUCH AS:

DEFENSE PRODUCTION ACT INVENTORIES
GOVERNMENT OWNED SURPLUSES
COMMODITY CREDIT CORPORATION
BARTER FOR AGRICULTURAL SURPLUSES



U. S. PRODUCERS AND IMPORTERS



INVENTORIES

OBJECTIVES

\$10.0 Billion, including
\$6.2 Billion minimum

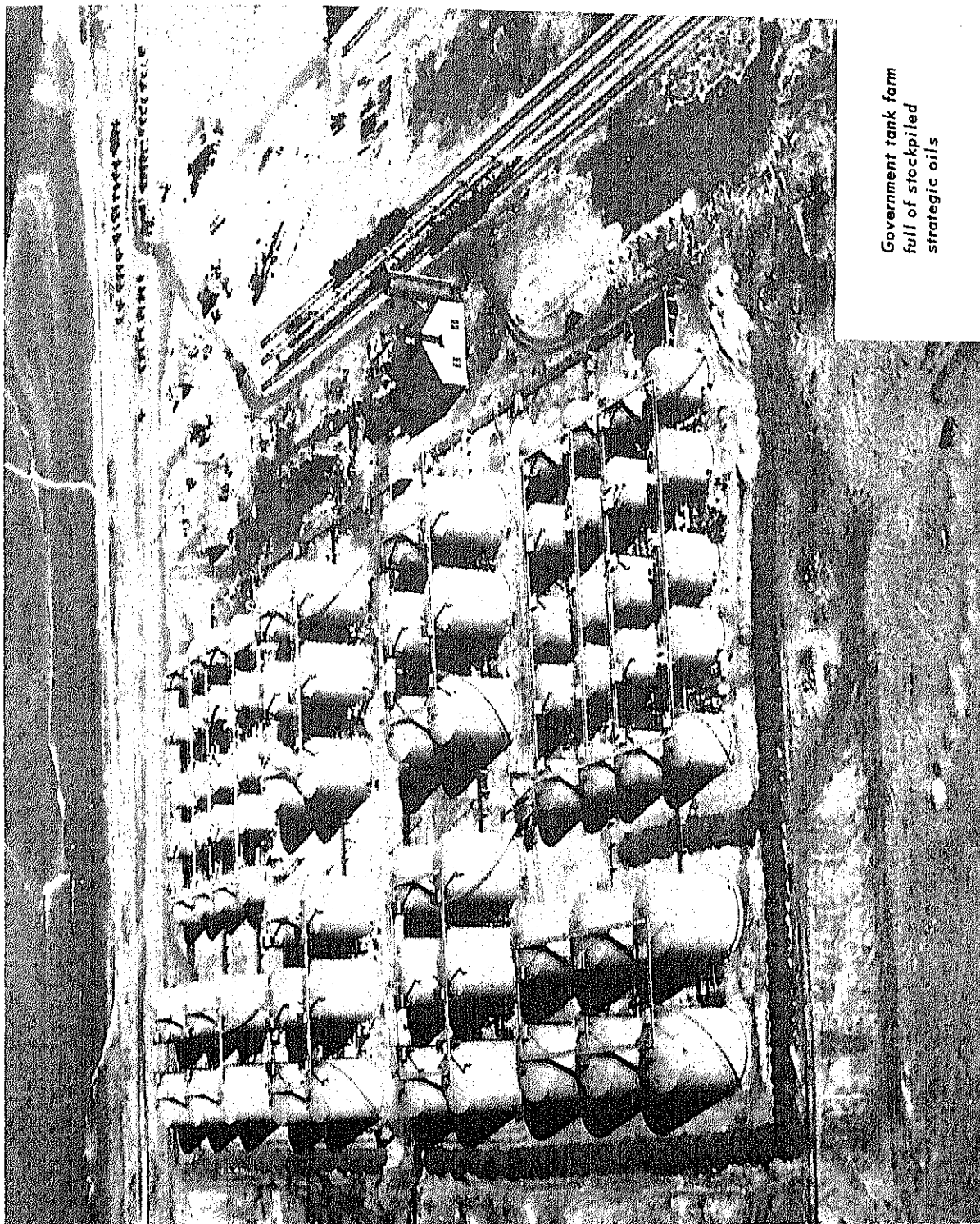
ON HAND

\$6,200,000,000 25,500,000 Tons

6/30/57



Natural rubber for rotation of inventories just unloaded at dock for inspection and acceptance for stockpile delivery



Government tank farm
full of stockpiled
strategic oils

APPENDIX A
FINANCIAL SUMMARY OF STOCKPILE OPERATIONS AS OF JUNE 30, 1957
TABLE 1 STATUS OF OBLIGATIONAL OPERATIONS

AS OF JUNE 30, 1957

AUTHORITY	APPROPRIATED FUNDS ^{a/}	AUTHORIZATIONS FOR		TOTAL OBLIGATIONAL AUTHORITY (CUMULATIVE) ^{d/}
		MAKING ADVANCE CONTRACTS ^{b/}	LIQUIDATING OUTSTANDING ADVANCE CONTRACTS ^{c/}	
Under PL 117 - 76th Congress				
PL 361 - 76th Congress, August 9, 1939	\$ 10,000,000			\$ 10,000,000
PL 442 - 76th Congress, March 25, 1940	12,500,000			22,500,000
PL 667 - 76th Congress, June 26, 1940	47,500,000			70,000,000 ^{e/}
Under PL 520 - 79th Congress				
PL 663 - 79th Congress, August 8, 1946	100,000,000			100,000,000
PL 271 - 80th Congress, July 30, 1947	100,000,000	75,000,000		275,000,000
PL 785 - 80th Congress, June 25, 1948	225,000,000	300,000,000		800,000,000
PL 785 - 80th Congress, June 25, 1948	75,000,000		75,000,000	800,000,000
PL 119 - 81st Congress, June 23, 1949	40,000,000	270,000,000		1,110,000,000
PL 150 - 81st Congress, June 30, 1949	275,000,000	250,000,000		1,635,000,000
PL 150 - 81st Congress, June 30, 1949	250,000,000			1,635,000,000
PL 434 - 81st Congress, October 29, 1949			250,000,000	1,535,000,000
PL 759 - 81st Congress, September 6, 1950	365,000,000			1,660,000,000
PL 759 - 81st Congress, September 6, 1950	240,000,000	125,000,000		2,025,000,000
PL 843 - 81st Congress, September 27, 1950	573,232,449 ^{g/}			2,598,232,449
PL 911 - 81st Congress, January 6, 1951	1,834,911,000			4,433,143,449
PL 253 - 82nd Congress, November 1, 1951	590,216,500			5,023,359,949
PL 253 - 82nd Congress, November 1, 1951	200,000,000		200,000,000	5,023,359,949
PL 455 - 82nd Congress, July 25, 1952	203,979,000			5,157,338,949
PL 176 - 83rd Congress, July 31, 1953			70,000,000	5,127,338,949
PL 428 - 83rd Congress, June 24, 1954			30,000,000	5,099,738,949
PL 663 - 83rd Congress, August 26, 1954	379,952,000 ^{h/}		27,600,000	5,479,690,949
PL 112 - 84th Congress, June 30, 1955	321,721,000 ^{i/}			5,801,411,949
PL 112 - 84th Congress, June 30, 1955	27,400,000			5,801,411,949
Total PL 520	5,801,411,949 ^{i/}	1,020,000,000	27,400,000	5,801,411,949
TOTAL PL 117 AND PL 520	5,871,411,949 ^{i/}	1,020,000,000	1,020,000,000	5,871,411,949

- ^{a/} Congressional appropriations of funds for stockpiling purposes.
- ^{b/} Congressional appropriations of contracting authority for stockpiling purposes in advance of appropriation of funds.
- ^{c/} Congressional authorization to liquidate outstanding obligations incurred under previously granted advance contract authority.
- ^{d/} Cumulative total of appropriated funds and advance contract authorization, less authorization to liquidate outstanding advance contracts.
- ^{e/} Excludes \$8,845,792 received from sale of stockpile materials for wartime consumption. Receipts were returned to Treasury, February 1948.
- ^{f/} Cancellation of previously authorized authority to make contracts.
- ^{g/} Excludes \$25,404,921 transferred to operating expenses for rehabilitation of Government-owned material producing plants.
- ^{h/} Excludes \$48,000 transferred to Transportation and Public Utilities Service, GSA.
- ^{i/} Excludes \$430,000 transferred to Transportation and Public Utilities Service, GSA and \$199,349,000 transferred to General Fund Receipts on June 27, 1956 - PL 623 - 84th Congress.
- ^{j/} Excludes receipts from rotational sales.

Source: General Services Administration

TABLE 2 TOTAL OBLIGATIONS AND EXPENDITURES OF STOCKPILING FUNDS

CUMULATIVE AND BY FISCAL PERIOD, THROUGH JUNE 30, 1957

FISCAL PERIOD	OBLIGATIONS INCURRED ^{a/}		EXPENDITURES ^{b/}	
	NET CHANGE BY FISCAL PERIOD	CUMULATIVE AS OF END OF PERIOD	BY FISCAL PERIOD	CUMULATIVE AS OF END OF PERIOD
Prior to Fiscal Year 1947	\$ 54,983,152	\$ 54,983,152	\$ 54,970,732	\$ 54,970,732
Fiscal Year 1947	68,888,533	123,871,685	11,359,999	66,330,731
Fiscal Year 1948	252,901,411	376,773,096	82,907,575	149,238,306
Fiscal Year 1949	459,766,881	836,539,977	304,486,177	453,724,483
Fiscal Year 1950	680,427,821	1,516,967,698	440,834,970	894,559,453
Fiscal Year 1951	2,075,317,099	3,592,284,897	655,537,199	1,550,096,652
Fiscal Year 1952	948,117,547	4,540,402,444	844,683,459	2,394,780,111
Fiscal Year 1953	252,375,163	4,792,777,607	906,158,850	3,300,938,961
Fiscal Year 1954	116,586,681	4,909,364,288	644,760,321	3,945,699,282
Fiscal Year 1955	321,799,833	5,231,164,121	801,310,094	4,747,009,376
Fiscal Year 1956 ^{c/}	251,692,667	5,482,856,788	382,011,786 ^{c/}	5,129,021,162 ^{c/}
Fiscal Year 1957	190,000,109	5,672,856,897	354,576,558	5,483,597,720

^{a/} Figures are the sum of obligations incurred under PL 520, 79th Congress and PL 117, 76th Congress. Final obligations under PL 117, 76th Congress were incurred in Fiscal Year 1949.

^{b/} Figures are the sum of expenditures under PL 520, 79th Congress and PL 117, 76th Congress. Final expenditures under PL 117, 76th Congress were made in Fiscal Year 1951.

^{c/} 1956 and subsequent fiscal periods and cumulative expenditures are reported on an accrual basis.

Source: General Services Administration

TABLE 3 EXPENDITURES OF STOCKPILING FUNDS, BY TYPE

CUMULATIVE AND FOR FISCAL YEAR 1957

TYPE OF EXPENDITURE	CUMULATIVE THROUGH DECEMBER 31, 1956 a/	SIX MONTHS ENDED JUNE 30, 1957	CUMULATIVE THROUGH a/ JUNE 30, 1957
Expenditures			
Gross Total	\$5,697,289,707	\$251,847,050	\$5,949,136,757
Less: Adjustments for Receipts from Rotation Sales and Reimbursements	434,424,550	31,114,487	465,539,037
Net Total	5,262,865,157	220,732,563	5,483,597,720
Material Acquisition Costs, Total	5,032,027,379	198,727,255	5,230,754,634
Stockpile Maintenance Costs, Total	199,137,314	20,606,112	219,743,426
Facility Construction	43,928,014	0	43,928,014
Storage and Handling Costs	125,922,551	7,764,709	133,687,260
Net Rotation Costs	29,286,749	12,841,403	42,128,152
Administrative Costs	31,700,464	1,399,196	33,099,660

a/ Cumulative figures are the total of expenditures under PL 117, 76th Congress and PL 520, 79th Congress. Expenditures under PL 117, 76th Congress totaled \$70,000,000, of which \$55,625,237 was for materials acquisition costs and \$14,374,763 was for other costs. Final expenditures under PL 117 were made in FY 1951.

Source: General Services Administration

APPENDIX B
CURRENT LIST OF
STRATEGIC AND CRITICAL MATERIALS FOR STOCKPILING
December 2, 1957

GROUP 1 MATERIALS

The following list constitutes Group 1 of the materials in the strategic stockpile. These materials have been or may be acquired through purchase pursuant to Section 3(a), and by transfer of Government-owned surpluses pursuant to Section 6(a) of Public Law 520, 79th Congress. All materials purchased must conform to stockpile specifications. Some of these materials are not under active procurement.

- | | |
|--|---|
| 1. Abrasives, Grade Aluminum Oxide | 38. Magnesium |
| 2. Agar | 39. Manganese, Battery Grade, Natural Ore |
| 3. Aluminum | 40. Manganese, Battery Grade, Synthetic Dioxide |
| 4. Antimony | 41. Manganese, Chemical Grade, Type A Ore |
| 5. Asbestos, Amosite | 42. Manganese, Chemical Grade, Type B Ore |
| 6. Asbestos, Chrysotile | 43. Manganese Ore, Metallurgical Grade |
| 7. Asbestos, Crocidolite | 44. Mercury |
| 8. Bauxite, Metal Grade, Jamaica Type | 45. Mica, Muscovite Block,
Stained A/B and Better |
| 9. Bauxite, Metal Grade, Surinam Type | 46. Mica, Muscovite Film,
First and Second Qualities |
| 10. Bauxite, Refractory Grade | 47. Mica, Muscovite Splittings |
| 11. Beryl | 48. Mica, Phlogopite Splittings |
| 12. Bismuth | 49. Molybdenum |
| 13. Cadmium | 50. Nickel |
| 14. Castor Oil | 51. Opium |
| 15. Celestite | 52. Palm Oil |
| 16. Chromite, Chemical Grade | 53. Platinum Group Metals, Iridium |
| 17. Chromite, Metallurgical Grade | 54. Platinum Group Metals, Palladium |
| 18. Chromite, Refractory Grade | 55. Platinum Group Metals, Platinum |
| 19. Cobalt | 56. Pyrethrum |
| 20. Coconut Oil | 57. Quartz Crystals |
| 21. Columbite | 58. Quinidine |
| 22. Copper | 59. Rare Earths |
| 23. Cordage Fibers, Abaca | 60. Rubber, Crude Natural |
| 24. Cordage Fibers, Sisal | 61. Selenium |
| 25. Diamond Dies, Small | 62. Shellac |
| 26. Diamonds, Industrial, Bort | 63. Silicon Carbide, Crude |
| 27. Diamonds, Industrial, Stones | 64. Silk, Raw |
| 28. Feather and Down, Waterfowl | 65. Silk Waste and Noils |
| 29. Fluorspar, Acid Grade | 66. Sperm Oil |
| 30. Fluorspar, Metallurgical Grade | 67. Talc, Steatite, Block |
| 31. Graphite, Ceylon - Crystalline & Amorphous | 68. Tantalite |
| 32. Graphite, Madagascar - Crystalline Flake & Fines | 69. Tin |
| 33. Graphite, other than Ceylon & Madagascar - Crystalline | 70. Tungsten |
| 34. Hyoscyne | 71. Vanadium |
| 35. Iodine | 72. Vegetable Tannin Extract, Chestnut |
| 36. Jewel Bearings | 73. Vegetable Tannin Extract, Quebracho |
| 37. Lead | 74. Vegetable Tannin Extract, Wattle |
| | 75. Zinc |

GROUP 11 MATERIALS

The following list constitutes Group 11 of the materials in the strategic stockpile. These materials have been acquired principally through transfer of Government-owned surpluses pursuant to Section 6(a) of Public Law 520, 79th Congress. None is under procurement.

- | | |
|---|---------------------------|
| 1. Bauxite, Abrasive | 6. Mica, Phlogopite Block |
| 2. Corundum | 7. Rutile |
| 3. Cryolite, Natural | 8. Sapphire and Ruby |
| 4. Diamond Dies, other than small | 9. Talc, Steatite, Ground |
| 5. Mica, Muscovite Block, Stained B and Lower | 10. Titanium Sponge * |
| | 11. Wool |

* As of June 30, titanium sponge was on the Group 1 list; it was transferred to Group 11 on September 11, 1957.

APPENDIX C

REPORTS ISSUED BY THE DEPARTMENT OF THE INTERIOR, JANUARY - JUNE 1957

BUREAU OF MINES

Reports of Investigations

- 5282 A rapid method for fluorometric determination of beryllium.
- 5283 Synthetic Mica Investigations, VIII. The manufacture of fluor-phlogopite by the internal electric-resistance melting process.
- 5284 Leadville drainage tunnel second project, Lake County, Colorado.
- 5285 Investigation of mercury deposits in Nevada and Malheur County, Oregon.
- 5291 Diamond-bit performance in schists.
- 5292 Mining investigations of manganese deposits in the Maggie Canyon Area, Artillery Mountains Region, Mohave County, Arizona.
- 5293 Synthetic Asbestos Investigations, III. Synthesis and properties of fibrous potassium-lead silicate.
- 5296 Investigation of tuffs near Lysite, Wyo., for selenium.
- 5298 Volatilization of tin chlorides from slime.
- 5299 The relative corrosion resistance of titanium and some of its alloys.
- 5300 Relationship of composition to thermal stability in the huebnerite-ferberite series of tungstates.
- 5301 A mineral-dressing study of manganese deposits of the Batesville, Arkansas, District.
- 5303 Bulk sampling by diamond drilling, Dudley Manganese Deposit, Northern District, Aroostook County, Maine.
- 5305 Preparation of high-purity electrolytic chromium.
- 5311 Consumable-electrode arc melting of titanium and its alloys.
- 5312 Beneficiation of iron-copper ores from Kasaan Peninsula, Prince of Wales Island, Alaska.
- 5313 Examination of copper-lead-zinc deposits, Cabarrus and Union Counties, North Carolina.
- 5315 Electrowinning titanium metal.
- 5319 Pikes Peak iron deposits, Maricopa County, Arizona.
- 5320 Copper mines and prospects adjacent to Landlocked Bay, Prince William Sound, Alaska.
- 5322 Electrowinning chromium metal.
- 5323 Percolation leaching of manganese ores with sulfur dioxide.
- 5324 Flotation of iron sulfides from zinc tailings of Southwestern Wisconsin lead-zinc district.
- 5327 Recovery of tin and tungsten from tin-smelter slags.
- 5328 A field test for selenium.
- 5330 Pilot-Plant flotation of manganese ore from the Maggie Canyon Deposit, Artillery Mountains Region, Mohave County, Arizona.
- 5336 Geologic factors related to block caving at San Manuel Copper Mine, Pinal County, Arizona.
- 5337 Synthetic Mica Investigations, IX. Review of progress from 1947 to 1955.
- 5339 Progress report on pegmatite investigations in South Dakota for fiscal years 1954-56 (beryl).
- 5340 Heavy-liquid techniques for rapid evaluation of sands by prospectors and plant operators (rare earths, zirconium).

Information Circulars

- 7766 Mining methods and costs, Standard Uranium Corp., Big Buck Mine, San Juan County, Utah (uranium-vanadium).
- 7767 Potential of heavy-mineral-bearing alluvial deposits in the Pacific Northwest (zirconium, columbite, etc.).
- 7768 Sampling deep ore deposits by rotary drilling and methods of surveying and controlling the direction of drill holes.
- 7771 Bibliography of zirconium.
- 7772 Safety plan at Ray Mines Division, Kennecott Copper Corp., Ray, Arizona.
- 7774 Mining methods and costs at the Westside mine of the Eagle-Picher Co., Cherokee County, Kansas.
- 7775 Use of prestressed precast shaft supports, Banner Mine, Lordsburg, New Mexico.
- 7780 Mining and milling methods and costs, Tri-State Zinc, Inc., Jo Daviess County, Illinois.
- 7781 Mining methods and costs at the Hayden Creek Mine of St. Joseph Lead Co., St. Francois County, Missouri.
- 7783 Methods and costs of deepening the Crescent Shaft, Bunker Hill & Sullivan Mining and Concentrating Co., Shoshone County, Idaho.
- 7784 Molybdenum Materials Survey.
- 7786 Mining methods and practices at the Mineral Hill Copper Mine, Banner Mining Co., Pima County, Arizona.
- 7788 Mining methods and practices at the Johnson Camp Copper-Zinc Mine, Coronado Copper & Zinc Co., Cochise County, Ariz.

U. S. GEOLOGICAL SURVEY

Professional Papers

- 285 Geology and base-metal deposits of West Shasta copper-zinc district, Shasta County, California.
- 289 Geology and ore deposits of the Garfield quadrangle, Colorado. (Lead-zinc)

Bulletins

- 1019-F Selected annotated bibliography of thorium and rare-earth deposits in the United States, including Alaska.
- 1024-F Tungsten deposits of the Hyder district, Alaska.
- 1024-G Some pegmatite deposits in southeastern Alaska. (Mica)
- 1024-H A geochemical exploration for antimony in southeastern Alaska.
- 1024-I Tungsten deposits in the Fairbanks district, Alaska.
- 1029-A Annotated bibliography of the analytical chemistry of niobium and tantalum, January 1935-June 1953.
- 1040 Base-Metal deposits of the Cordillera Negra, Departamento de Ancash, Peru. (Lead-zinc)
- 1042-D Quicksilver deposits near Weiser, Washington County, Idaho.
- 1042-F Zoning of the Bitter Creek vanadium-uranium deposit near Uravan, Colorado.
- 1042-I A reconnaissance study of the beach sands of Puerto Rico. (Ilmenite, chromite)

Published Geologic Quadrangle Maps

- Map GQ-95 Geology of the Ubehebe Peak quadrangle, California. (Lead, zinc, copper)

Published Mineral Investigations Field Studies Maps

- Map MF-82 Reconnaissance geologic map of the Ixas and Logdell quadrangles, Oregon. (Chromite, mercury)
- Map MF-85 Boot Mesa NE quadrangle, Arizona-Utah. (Uranium, vanadium)
- Map MF-96 Preliminary geologic map of Placerville quadrangle, Colorado. (Vanadium)
- Map MF-99 Bedrock geology of the south central part of North Range Cuyuna district, Minnesota. (Iron, manganese)
- Map MF-116 Geology and zinc-lead deposits in the Catfish Creek area, Dubuque County, Iowa.

Maps and Reports placed on open file for public inspection

- Geology of Precambrian rocks, Keystone pegmatite district, southern Black Hills, So. Dakota. (Mica, beryl)
- Report on molybdenite in northeastern Wisconsin.

